



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/620,782

07/15/2003

Dirk J. Sundt

501085.02

1121

27076

7590

07/03/2008

DORSEY & WHITNEY LLP  
INTELLECTUAL PROPERTY DEPARTMENT  
SUITE 3400  
1420 FIFTH AVENUE  
SEATTLE, WA 98101

EXAMINER

HU, SHOUXIANG

ART UNIT

PAPER NUMBER

2811

MAIL DATE

DELIVERY MODE

07/03/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/620,782	<b>Applicant(s)</b> SUNDT ET AL.	
	<b>Examiner</b> Shouxiang Hu	<b>Art Unit</b> 2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 10 April 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 25,26,28,33-36,42,43 and 46 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 25,26,28,33-36,42,43 and 46 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 25, 26 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koga (US 6,177,331) in view of Witek (Witek et al., US 6,146,970) and/or Noguchi (Noguchi et al., US 2001/0030367).

Koga discloses a semiconductor structure in the embodiment of Figs. 3a-3d, comprising:

a trench formed in a substrate (101);

a first layer (a middle portion and a top portion of the protection layer structure 105 or 108) formed over the substrate, having a tapered opening (or faceted) formed therethrough over the trench, the opening having a first dimension on a first surface of the first layer adjacent to the trench and a second dimension on a second surface of the first layer opposite to the first surface, wherein the first dimension is smaller than the second dimension and substantially equal the width of the underlying trench;

a pad layer (a bottom portion of the protection layer structure 105 or 108) between the substrate (101) and the above identified first layer of silicon nitride material; and,

a mask layer (106) formed over the above identified first layer, the mask layer having an opening therethrough positioned over the tapered opening and having a dimension less than the second dimension of the tapered opening of the above identified first layer.

Koga does not expressively disclose that the materials for the protection layer structure (105 or 108) and the mask layer can be switched so that the protection layer structure can be formed of silicon nitride and/or that the mask layer can be formed of silicon oxide.

However, one of ordinary skill in the art would readily recognize that the protection layer structure (105 or 108) in Koga functions as an etching stopper layer underlying the mask layer (106; particularly see Fig. 3b); that it is art-known that silicon oxide layer and silicon nitride layer are commonly used as a mask layer and an etching stopper layer in either orders because of their well known etching selectivity between them in either dry and wet etchings, as readily evidenced in Witek (see col. 8, lines 43-46); and/or that silicon nitride layer is also commonly used as an etching stopper layer underlying a silicon oxide mask layer, as evidenced in Noguchi (see the silicon oxide mask layer 39 and the underlying silicon nitride etching stopper layer 38 in Figs. 50 and 51; also see [0295]).

Therefore, it would have been obvious to one of ordinary skill in the art to make the semiconductor structure of Koga with the protection layer structure (i.e., the first layer) being formed of silicon nitride and/or with the mask layer being formed of silicon oxide, per the teachings of Witek and/or Noguchi, so that a semiconductor structure with

desired material choice for the protection layer structure and/or the mask layer would be obtained, since it has been held that:

The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

And, with the protection layer structure being formed of silicon nitride material in the above collectively taught semiconductor structure, the bottom portion of such protection layer structure is still readable as the recited pad layer in a manner substantially same as or similar to that in the protection layer structure in Koga.

Furthermore, it is noted any potential process implications associated with the above collectively taught structure, and/or any potential process implications regarding how the pad layer (i.e., the bottom portion of the protection layer structure) and/or the silicon nitride layer (the middle and top portions of the protection layer structure) are formed in the above collectively taught semiconductor structure, would all be regarded as process limitations. However, such process limitations would not carry patentable weight in the claims drawing to a structure, because distinct structure is not necessarily produced. In re Thorpe, 227 USPQ 964, 966 (Fed. Cir. 1985).

3. Claims 33-36, 42-43 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koga (US 6,177,331) in view of Witek (Witek et al., US 6,146,970) and/or Noguchi (Noguchi et al., US 2001/0030367), as applied to claims 25-26 and 28 above, and further in view of Peidous (Peidous et al., US 6,027,982; of record).

Koga, Witek and Noguchi do not expressively disclose that the above structure can further include a pad layer formed of a material that is not of silicon nitride.

However, one of the ordinary skill in the art would readily recognize that such a pad layer can be desirably included so as to further protect the surface of the substrate, as evidenced in Peidous (see the silicon oxide pad layer 32 underlying the silicon nitride layer 33 and the silicon oxide layer 34 in Fig. 3).

Therefore, it would also have been obvious to one of ordinary skill in the art to further incorporate the art-known silicon oxide pad layer, such as that of Peidous, into the above collectively taught structure, so that a semiconductor structure with desired further protection to the substrate would be obtained.

Regarding claim 34, the materials of the substrate and the silicon nitride layer in the above collectively taught structure can naturally be selectively etched with respect to one another

### ***Response to Arguments***

Applicant's arguments filed on October 18, 2007, have been fully considered but they are not persuasive.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., the pad layer being a different material than the tapered layer) are not recited in the relevant rejected claims (claims 25-26 and 28). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims.

See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). And, the scope of these relevant claims covers a case in which the pad layer is also formed of a material same as that of the first layer. Thus, the boundary between the recited pad layer and the tapered layer may not be necessarily identifiable in such a case, although it may still have some process implication. However, as noted before, any potential process implications associated with the above collectively taught structure with respect to these relevant claims (25-26 and 28), and/or any potential process implications regarding how the pad and/or the tapered layer are formed in the above collectively taught semiconductor structure, would all be regarded as process limitations. And, such process limitations would not carry patentable weight in the claims drawing to a structure, because distinct structure is not necessarily produced. In re Thorpe, 227 USPQ 964, 966 (Fed. Cir. 1985).

With respect to applicant's alleged teaching away by Koga, it is noted that one of ordinary skill in the art would readily recognize that the protection layer structure (i.e., the first layer, 105 or 108) in Koga functions as an etching stopper layer during the patterning of the overlying mask layer (106; particularly see Fig. 3b). And, as evidenced in Witek and/or Noguchi, it is art-known that silicon oxide layer and silicon nitride layer are commonly used as a mask layer and an etching stopper layer in either orders because of their well known etching selectivity between them in either dry and wet etchings. Furthermore, it is also well known in the art that silicon nitride layer can also be desirably utilized as an etching stop layer during CMP process for desired CMP control, as further evidenced and expressly taught in Koga (col. 5, lines 50-54),

regardless whether or not it would require more process steps for removing such tapered layer latter.

Accordingly, the ordinary skill in the art would be further motivated to make the above collectively taught semiconductor structure, so as to achieve desired CMP control, per the further teachings of Koga.

### ***Conclusion***

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shouxiang Hu whose telephone number is 571-272-



Art Unit: 2811

1654. The examiner can normally be reached on Monday through Friday, 8:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynne Gurley can be reached on 571-272-1670. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Shouxiang Hu/  
Primary Examiner, Art Unit 2811